

WHAT IS CLAIMED IS:

1. A picture data reproducing apparatus which reproduces picture data recorded to a recording medium according the MPEG standard, the apparatus comprising:

a stream buffer which provisionally stores picture data grouped as a GOP which begins with an I picture;

a decoding means for reading picture data provisionally stored in the stream buffer sequentially starting with a previous picture and decoding the read picture data in the course of a FORWARD reproduction being done; and

a data adding means for additionally supplying picture data acquired from the recording medium to the stream buffer;

the data adding means additionally supplying, when the picture data provisionally stored in the stream buffer have been read by the decoding means to before last N, a predetermined amount of picture data beginning at the head of a GOP including picture data in the remaining N-th frame in the stream buffer.

2. The apparatus as set forth in claim 1, wherein the data adding means additionally supplies a predetermined amount of picture data corresponding to the capacity of the stream buffer to the latter.

3. The apparatus as set forth in claim 1, wherein the data adding means

additionally supplies the picture data to the stream buffer as in a ring buffer to next to the last picture already added to the stream buffer.

4. The apparatus as set forth in claim 1, wherein the data adding means additionally supplies, when the picture data provisionally stored in the stream buffer have been read by the decoding means to before last three frames, a predetermined amount of picture data beginning at the head of a GOP including picture data in the remaining third frame.

5. The apparatus as set forth in claim 1, wherein when the reproduction direction is shifted from FORWARD to REVERSE:

the decoding means reads the picture data provisionally stored in the stream buffer sequentially starting with a next picture and decode the read picture data; and

the data adding means additionally supplies, when picture data in a current GOP whose all grouped pictures are provisionally recorded in the stream buffer have been read by the decoding means to before last M frames, picture data in a previous GOP laid before at least the current GOP to the stream buffer.

6. A picture data reproducing apparatus for reproducing, by decoding, picture data compressed by encoding according to the MPEG Standard, comprising:

a stream buffer which provisionally stores the picture data grouped as a GOP which begins with an I picture;

a decoding means for reading the picture data provisionally stored in the stream buffer sequentially starting with a next picture and decoding the picture data in the

course of a REVERSE reproduction being done; and

a data adding means for additionally supplying picture data acquired from a recording medium to the stream buffer;

the data adding means additionally supplying, when picture data in a current GOP whose all grouped pictures are provisionally recorded in the stream buffer have been read by the decoding means to before last M frames, picture data in a previous GOP laid before at least the current GOP to the stream buffer.

7. The apparatus as set forth in claim 6, wherein the data adding means additionally supplying P frames of picture data beginning at the head of the current GOP in addition to the picture data in the previous GOP.

8. The apparatus as set forth in claim 7, wherein the data adding means acquires the picture data by calculating an additional amount of data (data_add) defined as $(P + \text{Max_GOP} - 1) \times \text{data_1frame} + \text{vbm_occupancy}$ where P is a number of frames in the current GOP, Max_GOP is a maximum number of pictures in a GOP, data_1frame is an amount of picture data read for one frame time in the normal-speed reproduction and vbm_occupancy is a data stored in a VBV (video buffering verifier) buffer, and starting reading picture data from a recording position, based on data_add, in the recording medium.

9. The apparatus as set forth in claim 6, wherein the data adding means additionally supplies an amount of picture data defined by $(\text{DTS_c} - \text{vbm_delay_c}) - (\text{DTS_f} - \text{vbm_delay_f})$ where DTS_c is DTS (decoding time stamp) in a top picture

in the current GOP, vbv_delay_c is a VBV delay of the top picture, DTS_f is DTS in the top picture in the current GOP and vbv_delay_f is a VBV delay of the top picture.

10. The apparatus as set forth in claim 6, wherein the data adding means determines an address in a stream buffer at which the addition of picture data is to be started correspondingly to an address of the top picture in the current GOP in the stream buffer, amount of picture data to be additionally supplied and the capacity of the stream buffer.

11. The apparatus as set forth in claim 6, wherein the data adding means additionally supplies the picture data as in a ring buffer.

12. The apparatus as set forth in claim 7, wherein the data adding means additionally supplies, when picture data in a current GOP whose all grouped pictures are provisionally recorded in the stream buffer have been read by the decoding means to before last three frames, picture data in a previous GOP laid before at least the current GOP to the stream buffer sequentially starting with the top picture in the previous GOP and, in addition, six frames of picture data beginning at the head of the current GOP to the stream buffer.

13. The apparatus as set forth in claim 6, wherein when the reproduction direction is shifted from REVERSE to FORWARD:

the decoding means reads the picture data provisionally stored in the stream buffer sequentially starting with a previous picture and decodes the picture data; and

the data adding means additionally supplies, when picture data provisionally

recorded in the stream buffer have been read by the decoding means to before last N frames, a predetermined amount of picture data beginning at the head of a GOP including picture data in the remaining N-th frame.

14. A picture data reproducing method of reproducing picture data recorded to a recording medium according the MPEG standard, the method comprising the steps of:

provisionally storing, into a stream buffer, picture data grouped as a GOP which begins with an I picture;

reading picture data provisionally stored in the stream buffer sequentially starting with a previous picture and decoding the read picture data in the course of a FORWARD reproduction being done; and

additionally supplying picture data acquired from the recording medium to the stream buffer;

when the picture data provisionally stored in the stream buffer have been read in the decoding step to before last N frames, a predetermined amount of picture data being additionally supplied, in the data adding step, beginning at the head of a GOP including picture data in the remaining N-th frame in the stream buffer.

15. The method as set forth in claim 14, wherein in the data adding step, there is additionally supplied a predetermined amount of picture data corresponding to the capacity of the stream buffer to the latter.

16. The method as set forth in claim 14, wherein in the data adding step,

there is additionally supplied the picture data to the stream buffer as in a ring buffer to next to the last picture already added to the stream buffer.

17. The method as set forth in claim 14, wherein in the data adding step, when the picture data provisionally stored in the stream buffer have been read by the decoding means to before last three frames, a predetermined amount of picture data is additionally supplied beginning at the head of a GOP including picture data in the remaining third frame.

18. The apparatus as set forth in claim 14, wherein when the reproduction direction is shifted from FORWARD to REVERSE:

in the decoding step, there is read the picture data provisionally stored in the stream buffer sequentially starting with a next picture and the read picture data is decoded; and

in the data adding step, when picture data in a current GOP whose all grouped pictures are provisionally recorded in the stream buffer have been read in the decoding step to before last M frames, there is additionally supplied picture data in a previous GOP laid before at least the current GOP to the stream buffer.

19. A picture data reproducing method of reproducing, by decoding, picture data compressed by encoding according to the MPEG Standard, comprising the steps of:

provisionally storing the picture data grouped as a GOP which begins with an I picture to a stream buffer;

reading the picture data provisionally stored in the stream buffer sequentially starting with a next picture and decoding the picture data in the course of a REVERSE reproduction being done; and

additionally supplying picture data acquired from a recording medium to the stream buffer;

in the data adding step, when picture data in a current GOP whose all grouped pictures are provisionally recorded in the stream buffer have been read in the decoding step to before last M frames, there is additionally supplied picture data in a previous GOP laid before at least the current GOP to the stream buffer.

20. The method as set forth in claim 19, wherein in the data adding step, there is additionally supplied P frames of picture data to the beginning of the current GOP in addition to the picture data in the previous GOP.

21. The method as set forth in claim 20, wherein in the data adding step, there is acquired the picture data by calculating an additional amount of data (data_add) defined as $(P + \text{Max_GOP} - 1) \times \text{data_1frame} + \text{vbm_occupancy}$ where P is a number of frames in the current GOP, Max_GOP is a maximum number of pictures in a GOP, data_1frame is an amount of picture data read for one frame time in the normal-speed reproduction and vbm_occupancy is a data stored in a VBV (video buffering verifier) buffer, and starting reading picture data from a recording position, based on data_add, in the recording medium.

22. The method as set forth in claim 19, wherein in the data adding step,

there is additionally supplied an amount of picture data defined by $(DTS_c - vbv_delay_c) - (DTS_f - vbv_delay_f)$ where DTS_c is DTS (decoding time stamp) in a top picture in the current GOP, vbv_delay_c is a VBV delay of the top picture, DTS_f is DTS in the top picture in the current GOP and vbv_delay_f is a VBV delay of the top picture.

23. The method as set forth in claim 19, wherein in the data adding step, there is determined an address in a stream buffer at which the addition of picture data is to be started correspondingly to an address of the top picture in the current GOP in the stream buffer, amount of picture data to be additionally supplied and the capacity of the stream buffer.

24. The method as set forth in claim 19, wherein in the data adding step, the picture data is additionally supplied as in a ring buffer.

25. The method as set forth in claim 20, wherein in the data adding step, when picture data in a current GOP whose all grouped pictures are provisionally recorded in the stream buffer have been read by the decoding means to before last three frames, there are additionally supplied picture data in a previous GOP laid before at least the current GOP to the stream buffer sequentially starting with the top picture in the previous GOP and, in addition, six frames of picture data to the beginning of the current GOP to the stream buffer.

26. The method as set forth in claim 19, wherein when the reproduction direction is shifted from REVERSE to FORWARD:

in the decoding step, there is read the picture data provisionally stored in the stream buffer sequentially starting with a previous picture and the read picture data is decoded; and

in the data adding step, when picture data provisionally recorded in the stream buffer have been read by the decoding means to before last N frames, there is additionally supplied a predetermined amount of picture data beginning at the head of a GOP including picture data in the remaining N-th frame.